

U-6A / NU-1B System

# U-6A / NU-1B Technical Support Contract

## Technical Assistance Activity Accomplishment Report

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## ***Revision History***

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<u><b>Issue</b></u>	<u><b>Date</b></u>	<u><b>Summary of Changes</b></u>
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# ***CONFORMITY INSPECTION REPORT***

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## **1.0 U-6A Airplane System**

Bombardier Services America Corporation (BSAC) and Viking Air, Ltd. inspected the USNTPS fleet of two (2) U-6 airplanes and associated documentation for the following:

Material condition, including but not limited to corrosion, fatigue, and general maintenance. Particular note was paid to effects of USNTPS-specific modifications, notably the glider tow package, on the basic airframe.

Incorporation of FAA Airworthiness Directives and manufacturer's service bulletins in the airplanes as currently maintained.

Identification of configuration differences between USNTPS airplanes and civil-specification DHC-2 airplanes.

BSAC has prepared a written report on the inspection results. The report states:

The material condition of the airplanes

The status of maintenance documentation

Status of the incorporation of applicable Airworthiness Directives and service bulletins

Configuration changes that would be required to convert these military-standard airplanes to conform to FAA civil certified DHC-2 standard.

## **2.0 Inspection Standards**

The standards that were used for the U-6A inspections were the DeHavilland DHC-2 Beaver Flight Manual 1-2-1, Maintenance Manual PSM 1-2-2, Repair Manual 1-2-3, Service Bulletins, Engineering Bulletins and Technical News Sheets; and FAA Airworthiness Directives.

Federal Aviation Regulations, Part 43 Maintenance and Inspections; and Part 91 General Operating Rules, were used to assist in establishing and clarification of the standards.

### 3.0 Hours Spent on Assignments

- 3.1. Conducting Technical Investigations and analysis of system performance.
- 3.2. Preparation of reports and recommendations for correction of deficiencies.
- 3.3. Time spent on travel status during normal and overtime work hours.

Date	BSAC Project Supervisor			Viking AME #1			Viking AME #2		
	3.1	3.2	3.3	3.1	3.2	3.3	3.1	3.2	3.3
June 9			6			21			
June 10	8			8					21
June 11	10			10			6		
June 12	10	2		10			10		
June 13	10	3		10			10		
June 14	10			10			3	2	
June 15		7							18
June 16		7							
June 17	11	1		11					
June 18	10			10					
June 19	8	4		12					
June 20		10		10					
June 21		2	6		2	18			
Totals:	77	36	12	91	2	39	19	2	39

Table 3.0: Hours Spent on Assignments

Total hours spent in Technical Investigations:	187
Total hours spent in preparation of reports and recommendations:	40
Total hours spent in travel;	90

## 4.0 Status of Maintenance Documentation

### 4.1. General Observations

The U-6A airplane maintenance documentation system in place is designed specifically for the US Navy aviation maintenance community. The tracking and filing processes that are currently in place ensure that most of the maintenance requirements are being addressed in a timely manner, however, our review of the maintenance records revealed that there was not a 100% capture of all required maintenance (see Tables 4.2.1 and 4.2.2) and inspection requirements. (See Appendices 1 and 2).

The incumbent maintenance contractor maintains the active airplane records in a neat and legible condition. When BSAC asked for access to records and planning documentation, the requested information was easily retrieved and accurate.

### 4.2. Differences from FAA Requirements

BSAC noted that, while appearing adequate for the current operator, maintenance record documentation did not meet the requirements of FAR Part 91:

#### §91.417 Maintenance records.

(a) Except for work performed in accordance with §§91.411 and 91.413, each registered owner or operator shall keep the following records for the periods specified in paragraph (b) of this section:

(2) Records containing the following information:

(ii) The current status of **life-limited parts** of each airframe, engine, propeller, rotor, and appliance.

(iii) The **time since last overhaul** of all items installed on the aircraft which are required to be overhauled on a specified time basis.

(v) The current status of **applicable airworthiness directives** (AD) including, for each, the method of compliance, the AD number, and revision date. If the AD involves recurring action, the time and date when the next action is required.

#### 4.2.1. Life-limited Parts, FAR 91.417 (a) (2) (ii)

DeHavilland DHC-2 Beaver Service Bulletin No. 2/3, Reissued May 14, 1982, established replacement times for the following components installed on the US Navy U-6A airplanes:

Description	P/N	Life Limit
Wing Strut	C2W1103A	20,000 flying hours
Wing Strut	C2W1104A	20,000 flying hours
Wing Strut Attachment Bolt	AN180-26	At strut replacement
Wing Strut Attachment Bolt	C2W497	At strut replacement

Table 4.2.1: Life-limited Parts

#### 4.2.2. Recommended Overhaul / Replacement Schedules, FAR 91.417 (a) (2) (iii)

The DeHavilland DHC-2 Beaver Maintenance Manual PSM 1-2-2 establishes a recommended overhaul or replacement schedule. Current information is found in Temporary Revision No. 2-17, issued May 6, 1996, and Temporary Revision 2-22, issued August 3, 1998. Established overhaul / replacement times are as follows for components installed on the US Navy U-6A airplanes:

Description	P/N (if applicable)	In-Service Schedule
Engine		Overhaul at 800 hours
Spark Plugs		Replace at 200 hours
Propeller		Overhaul at 800 hours
Propeller Governor		Overhaul at 800 hours
Tachometer Generator		Overhaul at 2000 hours or 36 months, whichever occurs first.
Fuel Selector Valve	TC-17300-7	Overhaul every 5 years.
Flap Actuating Jack		Overhaul at 1400 hours
Ratchet Valve		Overhaul at 1400 hours
Horizontal Stabilizer-to-Fuselage Attachment Bolts		Replace at 1000 hours
Landing Gear Compression and Rebound Rubbers		Replace at 1000 hours or 24 months, whichever occurs first.
Strut Assembly, Front Fuselage, Left Hand	C2FS209 or C2FS3281A	Replace every 15 years
Strut Assembly, Front Fuselage, Right Hand	C2FS210 or C2FS3282A	Replace every 15 years

Table 4.2.2: Recommended Overhaul / Replacement Schedule

## 5.0 Material Condition of the U-6A Airplanes

### 5.1. Condition applicable to both airplanes.

The U-6A aircraft were inspected by BSAC in accordance with the basic 100 hour inspection detailed in the DHC-2 Maintenance Manual. Contract maintenance personnel have been inspecting the aircraft on the DeHavilland inspection cycle. However, we noted some areas of the aircraft require more attention. These areas are detailed later in this report.

Both aircraft need to be lubricated in a more diligent manner. We found several areas that were dry or lacked lubrication, causing premature component wear.



Interior and exterior protective paint applications were noted as being in poor condition. Exterior paint, especially on No. 34, is too thick and makes crack and defect detection difficult. This was confirmed when several cracks were discovered in the left side skin after repairs to the empennage stringers were started. Poor adhesion of interior paint enhances the potential for surface corrosion.

Workmanship and standards of sheet metal repairs leave opportunities for repairs to fail or cracks to continue to propagate. Existing sheet metal repairs especially those at or near STN 228, should be reviewed by comparison with the repair schemes in the DHC-2 Repair Manual, and reworked if necessary.

Aft cabin and fuselage areas need to be cleaned and maintained in a clean condition so that inspections and defect detection may be more easily accomplished.

Interior panels and upholstery have been in service for many years but remains in a serviceable condition.

## 5.2. Differences from FAA Requirements

Many sheet metal repairs performed on the U-6A airplane were not referenced in the maintenance records available during the inspection. From our civilian FAA point of view, BSAC determined these repairs did not conform to the DHC-2 Repair Manual, and some were performed in such a manner that they did not meet the FAA requirements found in Federal Aviation Regulation (FAR) Part 43:

### §43.13 Performance rules (general).

(a) Each person performing maintenance, alteration, or preventive maintenance on an aircraft, engine, propeller, or appliance ***shall use the methods, techniques, and practices prescribed in the current manufacturer's maintenance manual or Instructions for Continued Airworthiness prepared by its manufacturer, or other methods, techniques, and practices acceptable to the Administrator***, except as noted in §43.16. He shall use the tools, equipment, and test apparatus necessary to assure completion of the work in accordance with accepted industry practices. If special equipment or test apparatus is recommended by the manufacturer involved, he must use that equipment or apparatus or its equivalent acceptable to the Administrator.

(b) Each person maintaining or altering, or performing preventive maintenance, ***shall do that work in such a manner and use materials of such a quality, that the condition of the aircraft, airframe, aircraft engine, propeller, or appliance worked on will be at least equal to its original or properly altered condition*** (with regard to aerodynamic function, structural strength, resistance to vibration and deterioration, and other qualities affecting airworthiness).

### 5.3. Condition of Airplane No. 34.

The history of U-6A, Airplane No. 34 (DeHavilland S/N 1174) is documented back to August 22, 1961. Around December 11, 1962, the airplane was disassembled and components preserved for storage at the US Navy Salvage Yard. Around March 24, 1967, components were removed from storage and the airplane was reassembled for active service in the US Navy under Work Order 185-67. A data plate search on the installed components revealed that many major sub-assemblies installed on the airplane were not from the original OEM build of S/N 1174, therefore it is very important to verify applicability of SBs and ADs based upon physical verification of applicability, not just the serial number of the airframe.

Aside from sheet metal repairs mentioned in the conditions applicable to both airplanes, No. 34 is in generally good condition.

Airplane No. 34 has a recurring fuel leak that appears to be related to the installation of either the center fuel tank in the fuselage or the installation of the floor boards on top of the tank. The damage area on the tank has a closely located rubber chafing strip glued to the floor board on No. 34 that is 0.35 inches thick, the same strip on No. 35 is 0.26 inches thick. The additional thickness may prevent the center tank from flexing over a wide area as fuel moves inside the tank, causing localized stresses in the stiffening bead resulting in cracks. We recommend that further investigation and analysis should be conducted to determine installation problems are causing fuel tank cracking.

#### 5.3.1. Observations

Specific observations on the material condition of Airplane No. 34 are located in Attachment 1.

**NOTE:** The items in Attachment 1 were noted by personnel contracted to inspect the aircraft using civilian standards. For the purposes of this report, "unapproved" means not in accordance with DeHavilland DHC-2 manuals.

#### 5.3.2. Incorporation of Airworthiness Directives and Service Bulletins

Incorporation of Airworthiness Directives (ADs) and Service Bulletin compliance as mandated by AD is attached as Appendix 1 of this report. ATP Navigator software was used to research and document this section of the report. Whenever possible, compliance with an AD or Service Bulletin was verified with a visual inspection, unless the compliance inspection would require disassembly of the aircraft beyond the scope of Delivery Order 0001.

#### 5.3.3. Status of Glider Tow Package

The glider tow package was visually inspected during the conformity inspection of the U-6A. No obvious defects were noted in the physical condition of the towbar assembly.

Modification data to the empennage of the airplane was not available during the inspection. The structure and skins of the empennage were inspected for cracks, corrosion and missing fasteners. Noted defects are documented in Attachment 1. We recommend that glider towing be suspended until these defects are addressed, either through corrective action or risk assessment.

#### **5.4. Condition of Airplane No. 35.**

This airplane was operated and maintained by the Maine Forest Service from 1965 to 1989. On December 22, 1989, the airplane was transferred to the US Navy as a complete airplane. Records do not indicate that the aircraft was disassembled or stored.

The overall condition of No. 35 is much worse than No. 34. Control cables are worn and corroded, skins and bulkheads are cracked, and the interior primer is flaking off in large sections, leaving unprotected aluminum exposed to corrosive elements. Mechanical systems need to have close attention paid to them to bring the airplane up to standards.

During the initial inspection of the aircraft, it was noted that the glider towbar centerline was to the left of the airplane centerline. Upon removal of the towbar and comparison to the towbar removed from No. 34, both towbars appeared to be identical. During the symmetry check on No. 35, it was noted that the empennage was asymmetrical, with the horizontal stabilizers shifted to the left by 5/8 inch. This indicates the possibility of high side loads imposed on the tail of the airplane, and might account for the cracking noted in the STN 228 bulkhead and aft channel.

Because of the condition of the bulkhead and aft channel at STN 228, and taking into consideration that use of this airplane includes glider towing, we recommend replacement of the bulkhead and channel prior to further flight. We also recommend a more thorough and detailed inspection should be performed for additional damages once the cracked bulkhead and channel have been removed.

##### **5.4.1. Observations**

Specific observations on the material condition of Airplane No. 35 are located in Attachment 2.

**NOTE:** The items in Attachment 2 were noted by personnel contracted to inspect the aircraft using civilian standards. For the purposes of this report, "unapproved" means not in accordance with DeHavilland DHC-2 manuals.

##### **5.4.2. Incorporation of Airworthiness Directives and Service Bulletins**

Incorporation of Airworthiness Directives (ADs) and Service Bulletin compliance as mandated by AD is attached as Appendix 2 of this report. ATP Navigator software was used to research and document this section of the report. Whenever possible, compliance with an AD or Service Bulletin was verified with a visual inspection, unless the compliance inspection would require disassembly of the aircraft beyond the scope of Delivery Order 0001.

Sealants required by AD 53-23-02 have deteriorated to the point that fuel accumulation under the floor boards is possible. The AD requires a "No Smoking" placard in the cockpit until the sealants are redone.

During the inspection required by AD 84-09-06, cracks were found at the base of the control column. The AD requires repairs to be accomplished before further flight.

During the inspection required by AD 99-15-07, cracks were found in the STN 228 bulkhead. The AD requires repairs to, or replacement of, the bulkhead to be accomplished before further flight.

Engine cylinder heads were inspected for separation in accordance with AD 78-08-07. The No. 2 cylinder was found cracked in the area mentioned in the related Pratt & Whitney service information. The AD requires replacement of the cylinder.

#### **5.4.3. Status of Glider Tow Package**

The glider tow package was visually inspected during the conformity inspection of the U-6A. No obvious defects were noted in the physical condition of the towbar assembly.

Modification data to the empennage of the airplane was not available during the inspection. The structure and skins of the empennage were inspected for cracks, corrosion and missing fasteners. Noted defects are documented in Attachment 2. We recommend that glider towing be suspended until these defects are addressed by corrective action.

## **6.0 Configuration Changes Required for Conformance to FAA Standards.**

Requirements for conversion of the Navy U-6A airplanes to civilian DHC-2 Beaver airplanes are found in DeHavilland Service Bulletin No. 2/10, Revision G dated April 20, 1990. Paragraph 1 of the service bulletin addresses conversion to FAA requirements while paragraph 2 addresses the conversion to Canadian Department of Transportation requirements. Only the conversion to FAA requirements is within the scope of this report.

BSAC does not recommend voluntary compliance with Canadian Department of Transportation requirements found in paragraph 2 of the Bulletin No. 2/10. Many Canadian operators are petitioning the Canadian Department of Transportation to remove the engine fire warning and suppression systems mandated in paragraph 2.

### **6.1. Service Bulletin No. 2/10, Paragraph 1**

#### **6.1.1. Blanking cockpit and cabin roof windows**

Plexiglas windows are not designed to carry any structural stress loads. Service Bulletin No. 2/10 requires the removal of the four (4) windows in the upper fuselage and installation of aluminum filler plates. These plates are sealed and riveted in position so that stress loads imposed on the upper forward fuselage by the forward frame / engine mount and by the wing spars are transmitted through a larger area of structure. DeHavilland drawings C2M5811, C2M5819, C2M5823 and C2MK2022 are applicable.

#### **6.1.2. Removing door jettison mechanisms**

Military aircraft have door jettison mechanisms that are secured in the engaged positions until break-away lock wires are broken and the jettison mechanism operated to allow total separation of the door from the fuselage. FAA certified aircraft are required to have the jettison mechanisms removed in accordance with Service Bulletin No. 2/10 and the doors secured to the fuselage at the hinge positions with aircraft bolts. DeHavilland drawings C2M5825A and C2MK2022 are applicable.

### 6.1.3. Removal of military equipment installations

Paragraph 1 of Service Bulletin No. 2/10 specifies the removal of the bomb release switching panel. Both Navy U-6A airplanes have had these panels previously removed. However, this is not the full extent of the removal of military equipment. A note on drawing C2M5825A states "All military fittings and equipment are removed." Military fittings and equipment include, but are not limited to:

**6.1.3.1. Avionics (such as transponders, communications radios and navigation equipment.)**

**6.1.3.2. Flight instrumentation.**

**6.1.3.3. Seat belts and shoulder harnesses.**

**6.1.3.4. Airframe mounted racks and attachments.**

### 6.1.4. Installation of FAA data plate.

Service Bulletin No. 2/10 also requires a data plate made from stainless steel to be mounted to the cockpit interior that displays the aircraft S/N, FAA Type Specification number and a statement that the aircraft was modified in accordance with the service bulletin. DeHavilland drawing C2M5825A contains additional information.

## 6.2. Recommendations, Navy U-6A Aircraft Conformance to FAA Standards

### 6.2.1. Conformity

The Navy U-6A aircraft are civilian in origin and have a Type Certificate (A-806) issued by the FAA. The Type Certificate is used to establish the aircraft conformity status with regard to an FAA approved design as of the date of manufacture.

The U-6A are currently being maintained under multiple standards, including portions of the FAA requirements (AD compliance), DeHavilland manuals, and based upon what we have seen and been told, Navy practices. Mixed into the standards are the US Army Technical Orders for the L-20 version of the aircraft.

We recommend that a hierarchy of standards should be established to ensure the airworthiness of the U-6A airplanes. The hierarchy shown in Chart 6.2.1 would prioritize the standards used, with higher priority standards higher up in the hierarchy.

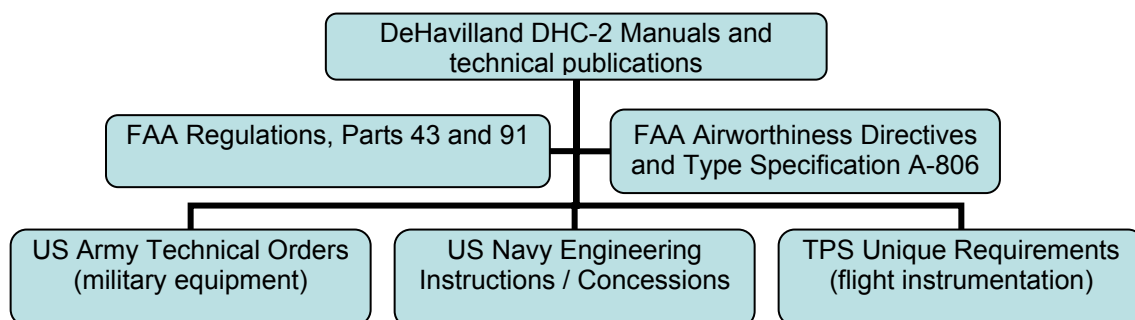


Chart 6.2.1: Hierarchy of Standards

Data and standards used establishing conformity should be documented in the U-6A airplane records. The more complete the records, the easier it will be to establish conformity to the Type Certificate or as modified by approved methods. The following are typical records needed:

- Records maintained by the military, the manufacturer, and any other prior owner pertaining to the manufacturing, inspection, maintenance, and operation of the aircraft.
- Where components and parts have been replaced since original manufacture, the records of the components and parts should show them as being produced under an FAA Production Certificate, FAA Parts Manufacturer Approval, FAA Approved Production Inspection System, or FAA Technical Standard Order and show that they are still in an airworthy condition.
- Records of any components and parts that have been fabricated or assembled by the Navy which establish that they conform to the type design or approved modifications.
- Records of engines, gear box assemblies, landing gears, instruments or other components or parts which establish that they originally conformed to the type design and have been maintained (overhauled, re-built, etc., re FAR 43 Standards) in accordance with the applicable FAA requirements.
- Where military records are being used to substantiate any portion(s) of conformity to FAA approved type design, the records for that specific aircraft, component or part are complete and accurate.
- Maintaining current weight and balance from actual weighing of aircraft, with calculations showing addition and removal of items when necessary.
- Maintain up-to-date compliance with all applicable Airworthiness Directives (ADs).
- Maintain up-to-date records of inspection.

### **6.2.2. Special Attention Areas**

Special attention should be given to the following areas which are critical to airworthiness:

#### **6.2.2.1. Major Components**

All major components of airplanes (wings, empennage, fuselage, landing gear, engine mount, cowlings, type certificated engine and propeller and related systems, controls and control systems, and instrumentation).

#### **6.2.2.2. Life-limited Parts**

Life-limited parts may be used for the remaining time left on the part providing the record of time is clearly reflected in the aircraft log books. End of life (time limit) must be reflected in the aircraft log. Where the military life is less than the civil life, the military life-limit will be used. Where the civil life-limit is less than the military, the civil will be used. In either case the time (life-limit) to be used is that of the lesser time. This can be exceeded only if a new life-limit is established on the type data sheet or engineering concession.

### **6.2.3. Emergency Locator Transmitter (ELT)**

FAR Part 91.207 addresses requirements for emergency locator transmitters. Navy U-6A airplanes do not have a legal requirement to have an ELT installed. However, in the interest of safety, an approved automatic type emergency locator transmitter meeting the requirements of Technical Standard Order (TSO) C91a in operable condition should be attached to the airplane.

#### **6.2.3.1. Installation Requirements**

The emergency locator transmitter must be attached to the airplane in such a manner that the probability of damage to the transmitter in the event of crash impact is minimized. Fixed and deployable automatic type transmitters must be attached to the airplane as far aft as practicable.

#### **6.2.3.2. Maintenance and Inspection**

Batteries used in the emergency locator transmitters must be replaced (or recharged, if the batteries are rechargeable):

- When the transmitter has been in use for more than 1 cumulative hour; or
- When 50 percent of their useful life (or, for rechargeable batteries, 50 percent of their useful life of charge) has expired, as established by the transmitter manufacturer under its approval. The new expiration date for replacing (or recharging) the battery must be legibly marked on the outside of the transmitter and entered in the aircraft maintenance record.
- Each emergency locator transmitter must be inspected within 12 calendar months after the last inspection for:
  - (1) Proper installation;
  - (2) Battery corrosion;
  - (3) Operation of the controls and crash sensor; and
  - (4) The presence of a sufficient signal radiated from its antenna. This should only be performed between the top of the hour and five minutes after.

#### **6.2.3.3. Integration of 406 Mhz ELT's**

BSAC recommends using the 406 Mhz ELT because it has significant technical improvements over the 121.5/243 Mhz ELT equipment system. 406 Mhz ELT's are compatible with the Search and Rescue Satellite-Aided Tracking System (COSPAS-SARSAT).

The COSPAS/SARSAT system has proven to be an effective tool in detecting and locating both maritime and aeronautical distress incidents. Data shows that this satellite system had been credited with saving more than 1,700 lives since it was commissioned in 1982. In many distress cases, the satellite system was the only means of detecting the distress signal.

The National Transportation Safety Board (NTSB) advocates mandatory conversion to the 406 Mhz standard. To accelerate the introduction of the 406 Mhz capability, and to provide an acceptable standard of certification for ELT's, the FAA issued TSO-C126 to provide a standard for significant performance and information improvements for ELT's. These improvements are expected to permit more effective and timely SAR response after aircraft accidents.

The FAA recommends, but does not require, carriage of 406 Mhz ELT's. Voluntary use of the 406 Mhz ELT's would provide an enhancement over the minimum requirements of the Federal Aviation Regulations. There may be even more life-saving benefits derived from the 406 Mhz ELT for those operations conducted over water and in remote areas; therefore, the FAA encourages installation of the 406 Mhz ELT although the 1121.5/243 Mhz ELT may continue to be used.

### **6.3. 100 Hour vs Annual Inspection**

DeHavilland inspection requirements for the U-6A airplanes are established in the DHC-2 Maintenance Manual, Appendix 2. Inspections are due every 100 hours of operation, with eight inspections at 100 hour intervals making a complete cycle.

FAR Part 91.409 states that no person may operate an aircraft unless, within the preceding 12 calendar months, it has had an annual inspection in accordance with FAR Part 43 and has been approved for return to service by a person authorized by FAR 43.7 (in most instances, this would be a person holding a FAA Inspection Authorization certificate).

An annual inspection may be substituted for a 100 hour inspection as long as it is performed by a person authorized to perform annual inspections and is entered as an "annual" inspection in the required maintenance records.

## **7.0 Addition Resources Available for U-6A Support**

Bombardier Services America Corporation (BSAC) appreciates the opportunity to support the United States Navy and the U-6A airplane fleet. We feel that our knowledge of the U-6A and our commitment to supporting the airplanes provided the operator and the maintenance contractor with a valuable impartial assessment of the current status of these airplanes.

Further resources available from BSAC are:

- Spares acquisition
- Modification / upgrading and installation of military avionics
- Total aircraft refurbishment
- Technical assistance
- Bombardier / DeHavilland engineering support
- Training in airplanes and systems

Your primary Point of Contact (POC) at BSAC is

Mark Matteson, TPS Project Manager

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# ***Attachment I: Airplane No. 34 Observations***

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**NOTE:** The items in this attachment were noted by personnel contracted to inspect the aircraft using civilian standards. For the purposes of this report, “unapproved” means not in accordance with DeHavilland DHC-2 manuals.

- 1. DHC-2 Maintenance Manual, Appendix 2, Part 5 TR 2-22 requires replacement of fuselage strut member every 15 years, no record of replacement. (See Canada AD CF-98-37 for Canadian accepted alternate means of compliance.)**
2. deleted, no discrepancy
3. Landing gear rebound rubbers are due for replacement in accordance with (IAW) DHC-2 Maintenance Manual, Appendix 2, Part 5, TR 2-22.
4. Certification of the altimeter and transponder is not being complied with every 2 years. (FARs 43, 91)
5. Pitot-static check not documented in records provided for review.
6. Engine instruments need to have range markings redone IAW with the DHC-2 Flight Manual to show better accuracy. (If marked on the glass, a slip mark is needed across the glass and bezel.)
7. Two required placards are not installed; 1) warning for no spins; and ~~2) airplane to be operated in accordance with the approved Flight Manual [deleted]~~ (reference Aircraft Specification A806, Note 2 (a) and (c).
8. Unapproved air speed indicator installed. Must be range marked per DHC-2 Flight Manual.

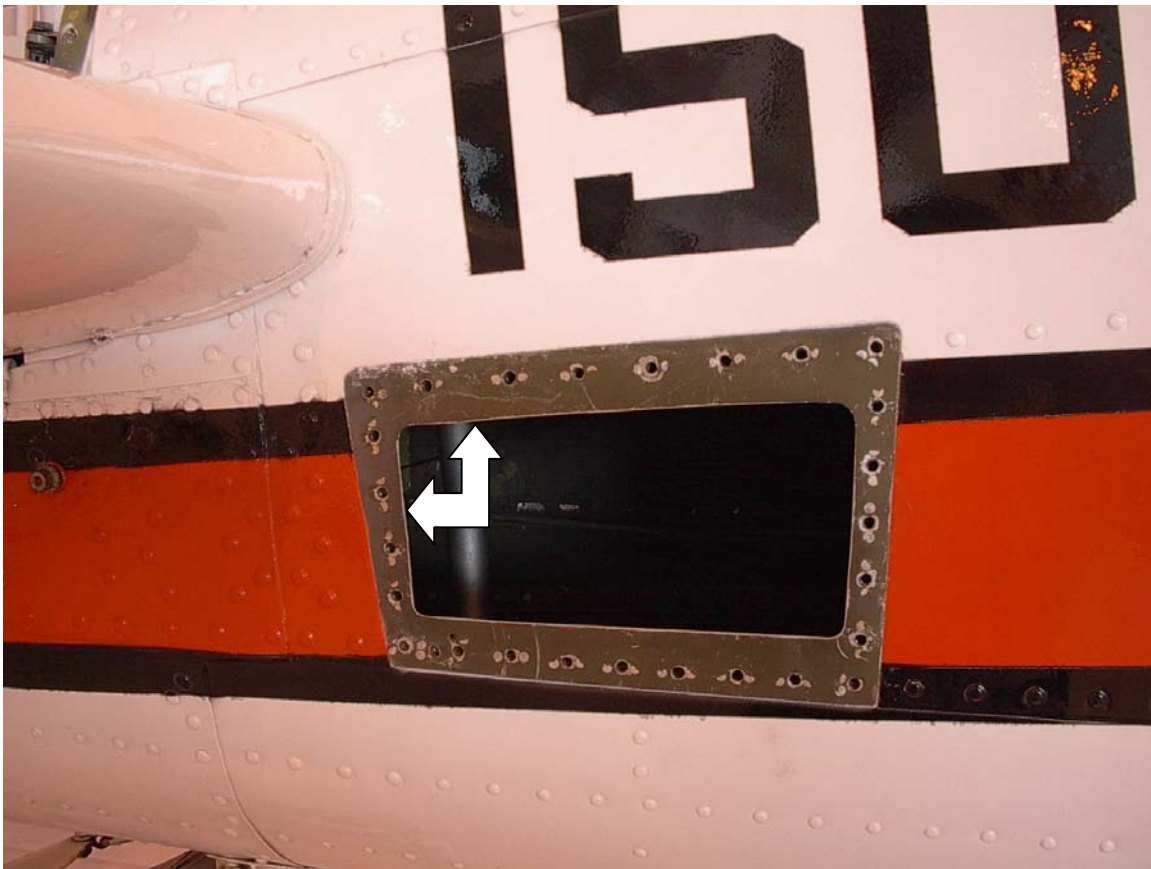
9. No approvals or supporting data found in the reviewed aircraft records for the following installed modifications:
- i. Metal luggage storage compartment



- ii. Long-range belly fuel tank and Flight Manual Supplement
  - iii. Concorde battery installed, smaller in amp hours (18 versus 24 or 36 original equipment)
  - iv. Glider towing package and Flight Manual Supplement
  - v. Chip detector
10. Flight Manual and Supplements are required to be on the aircraft.
11. Weight and Balance and Equipment List are required to be on the aircraft.
12. No record entries for the repair to the right wing leading edge, appears to be an unapproved repair.

13. Fuselage and belly skins at STN 228 do not overlap as required by DHC-2 Repair Manual, Section 4, paragraphs 4.9.1 through 4.9.3.

**14. No doubler on the inside of the inspection panel located just forward of STN 228, right side. No data supporting installation in reviewed records.**



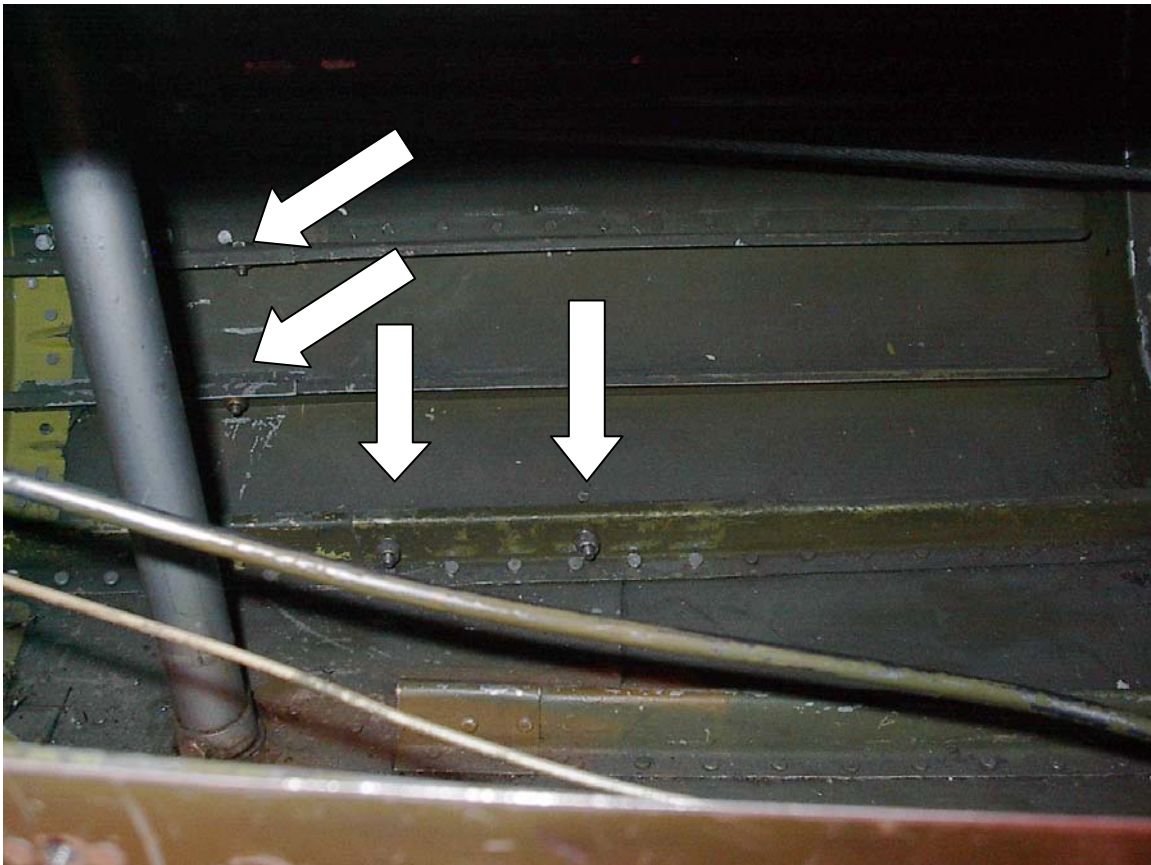
15. POSITIVE OBSERVATION: Tiebar repairs completed IAW the DHC-2 Repair Manual, Figure 4-14.

16. deleted, no discrepancy

17. Left aft door patch rivets do not have sufficient edge distance.

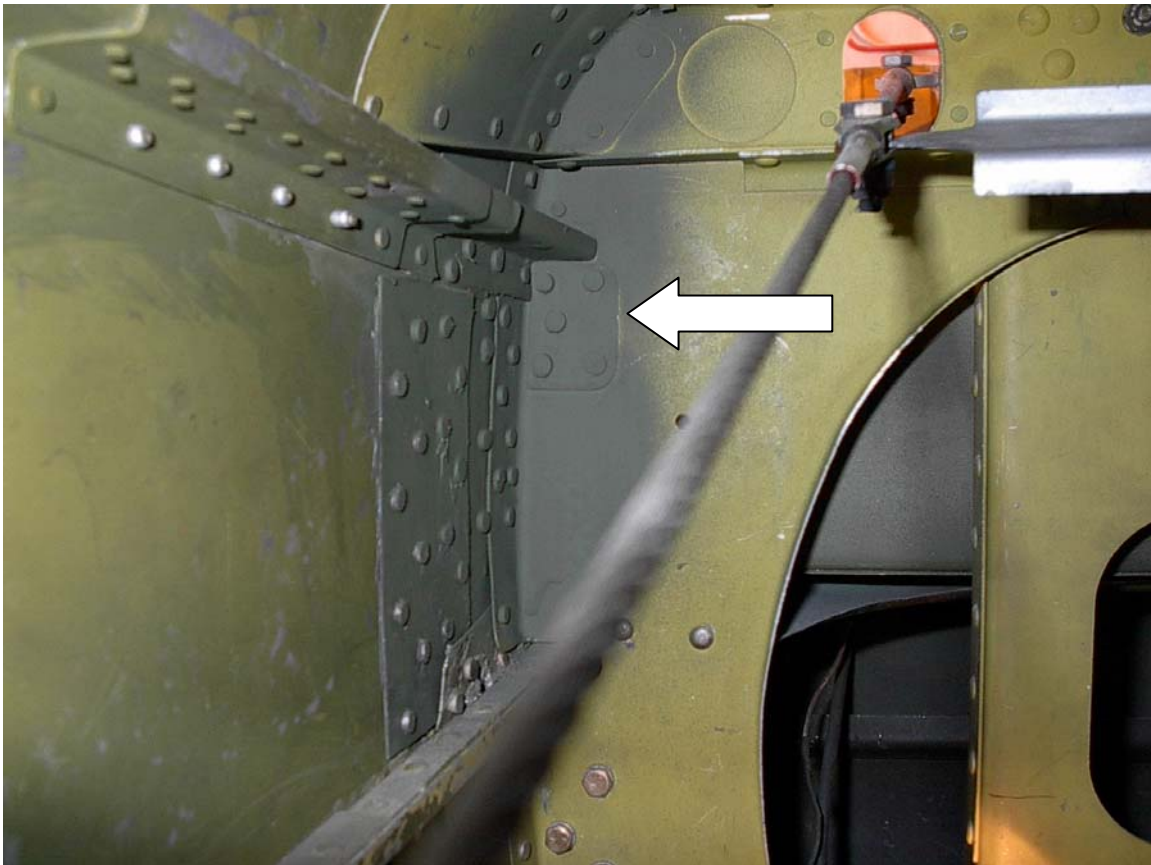
18. Left top skin of horizontal stabilizer has unapproved repair, reference DHC-2 Repair Manual Section 3, paragraph 3.17.

**19. Unapproved repairs (bolts in stringers) in tail section between STN 208 and STN 228. Reference DHC-2 Repair Manual Figure 4-9.**





**20. Structural support brackets (P/Ns C2FS5215/16) for tailplane pick-up missing.**



**21. SAFETY ITEM. Paint quality in poor condition. Multiple layers of paint make it difficult to identify defects in the sheet metal and structures. Recommendations:**

- i. Completely strip paint from aircraft
- ii. Inspect structures
- iii. Corrosion treat metal
- iv. Repair
- v. Repaint
- vi. Balance flight controls
- vii. Reweigh aircraft.

**22. POSITIVE OBSERVATION: Aircraft Weight and Balance is well documented and accurate.**

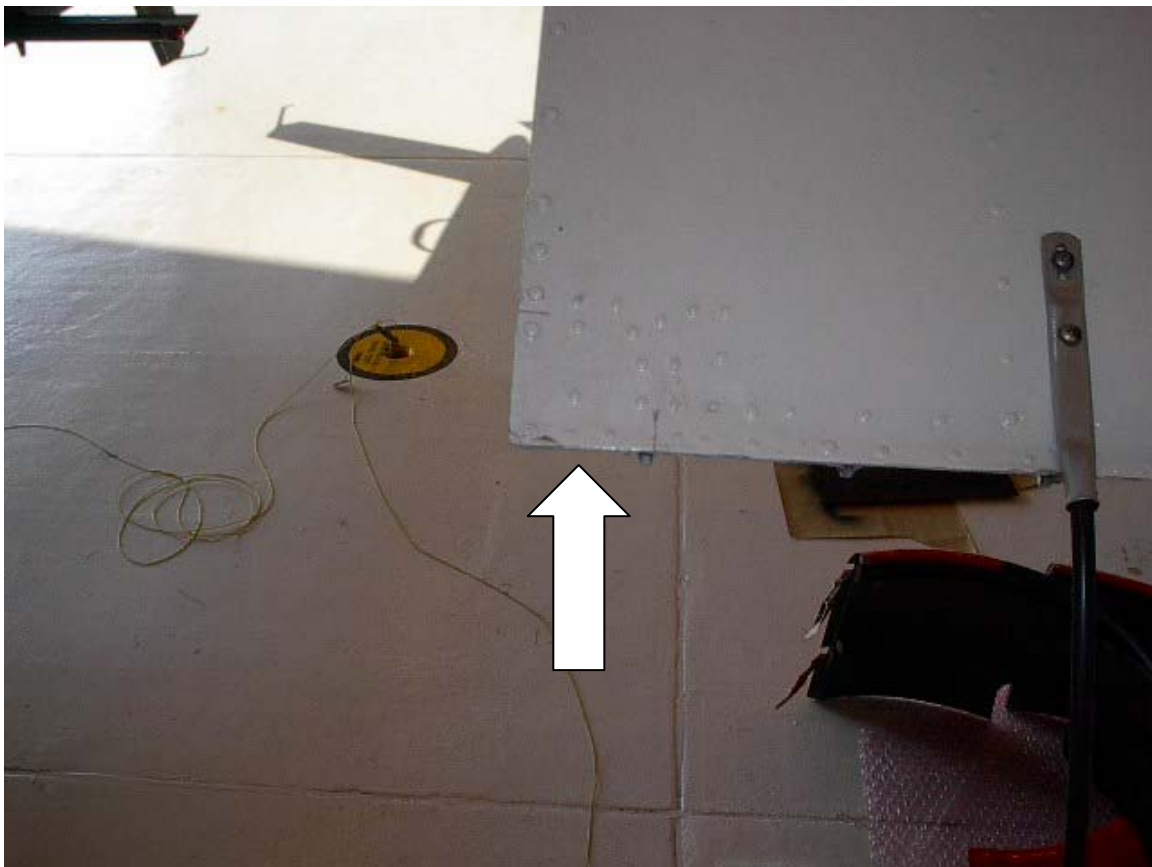
23. Burn test certifications for materials used in the interior were not in the records reviewed. (FAR 23.853 Requirement).

**24. Oil line between the firewall and the instrument panel has been chafed by lines to the directional gyro or the turn coordinator.**

25. Pitot line has been chafed by the flap indication cable housing.

26. Right pilot door inside skin chafed by window stop angle, chafing covered with aluminum foil tape.

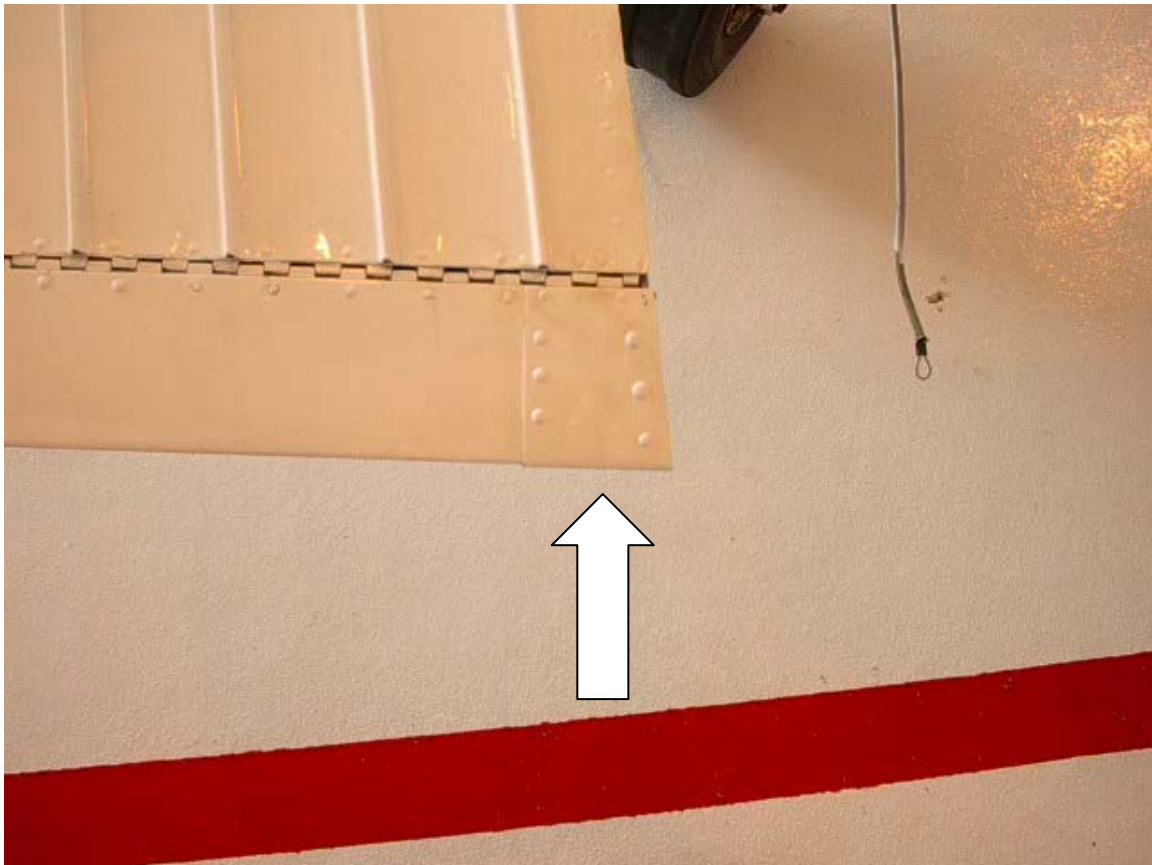
27. Left aileron outboard top skin has unapproved repair, reference DHC-2 Repair Manual, Section 2, paragraph 2.25.



28. Left aileron balance weight assembly has play between balance arm and machined fitting.

**29. Several rivets are not properly bucked inside the horizontal stabilizer center section.**

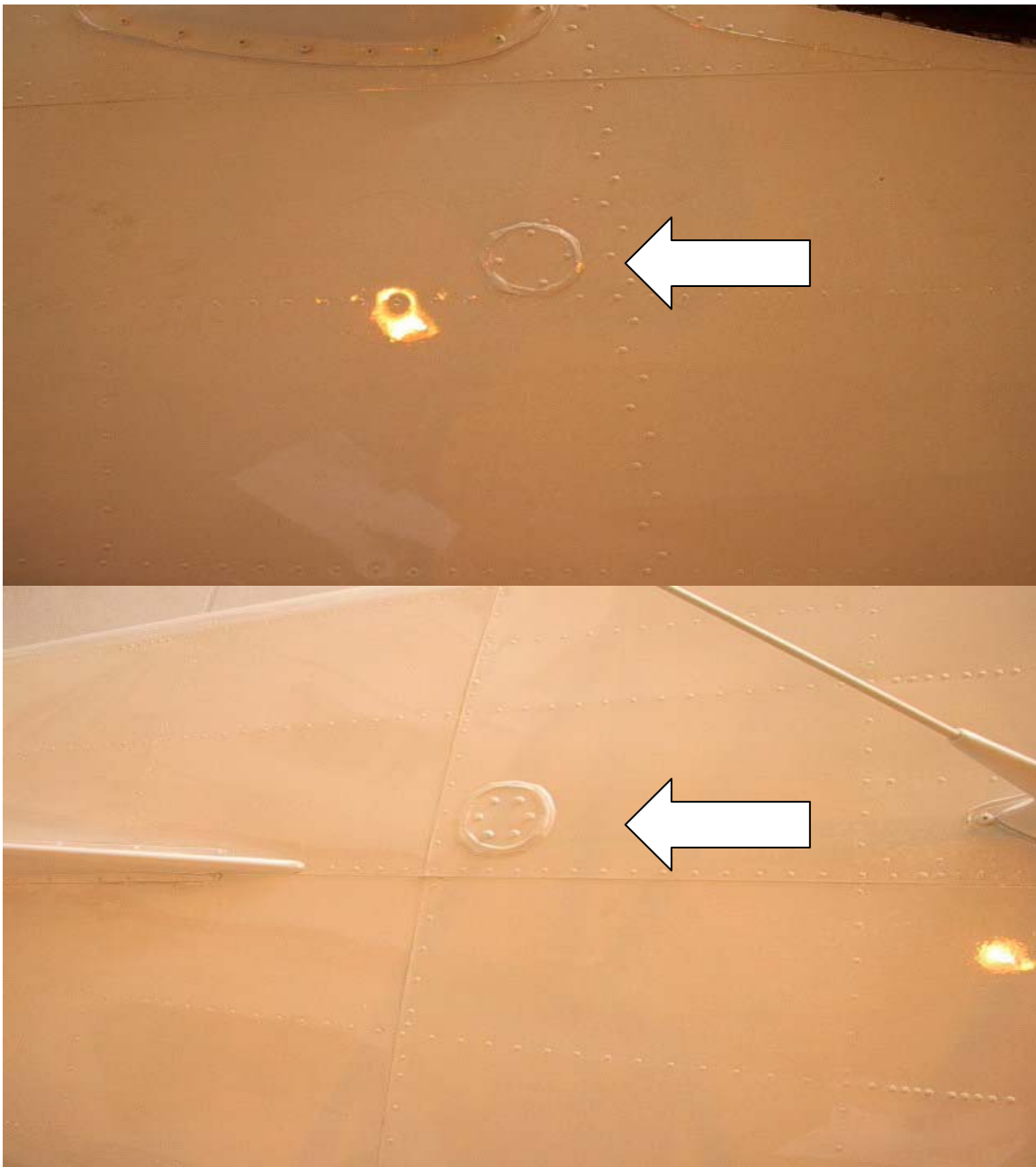
30. Left elevator trim tab has an unapproved repair, reference DHC-2 Repair Manual, Section 2, paragraph 2.25. Repair has resulted in left trim tab being out of rig by 4 degrees.



31. Aft bulkhead lower right side at STN 242 has crack approximately 1 inch long.

32. Stringer cracked/torn inside tail section, right side, STN 228.

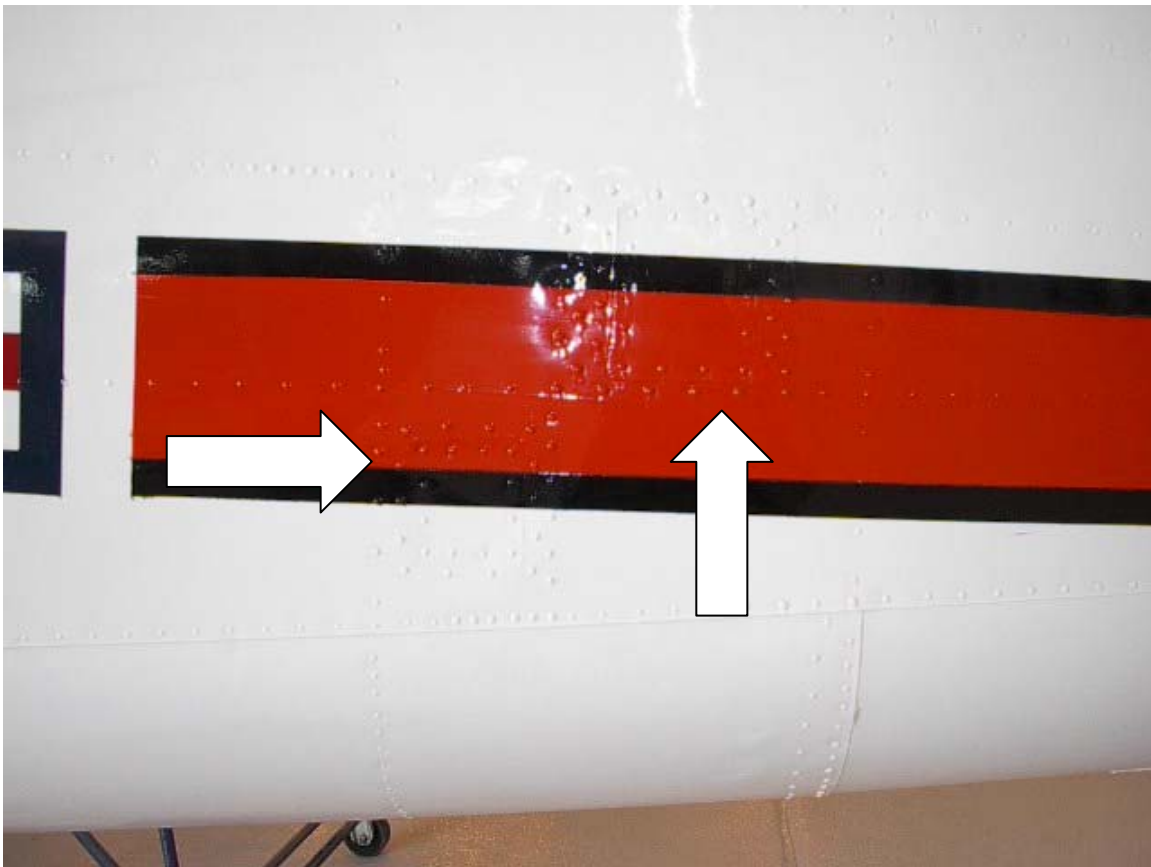
33. Patch repairs on top of fuselage at STNs 76 and 108 not repaired IAW the DHC-2 Repair Manual Appendix 2, Figure B1.



34. Static line clamps chafing on the static line at STN 132.



- 35. Elevator and rudder pulleys have heavy control cable grooves at STN 104.
- 36. Two patches on left fuselage skin at STN 165 not installed IAW the DHC-2 Repair Manual Appendix 2, Figure B1.



- 37. Elevator cable fairlead support bracket, P/N C2CF761ND, cracked at top of the bracket.
- 38. Rivet missing, lower right side of STN 228.
- 39. No TSO approval marked on solid static active filter, P/N 5915-860-6306.
- 40. deleted, no discrepancy
- 41. Left flight panel upper center shock mount bracket broken.
- 42. Flight panel shock mounts are cracked and deteriorated.

43. Pitot and static lines routed so that drains are not at the lowest points in the systems.
44. Left side skin repair at STN 76 not IAW DHC-2 Repair Manual Appendix 2, Figure B1.



45. Long range fuel tank connection at center tank has a deteriorated seal.
46. Right wing rib at STN 29 has numerous stop drilled cracks, does not conform to the DHC-2 Repair Manual, reference Section 2, Figure 2.8.
47. Right aileron balance weight assembly has play between balance arm and machined fitting.
48. Right aileron outboard trailing edge tip has cracked / deteriorated skin.
49. Right wing trailing edge shroud is cracked at the outboard end.

50. AD 53-11-02, to prevent chafing of the accessory firewall on the engine oil sump, has not been complied with. Recommend that the AD be complied with at next engine removal.



**51. Left aft fuselage side skins cracked in numerous places just forward of STN 228.**

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## ***Attachment 2 - Airplane No. 35***

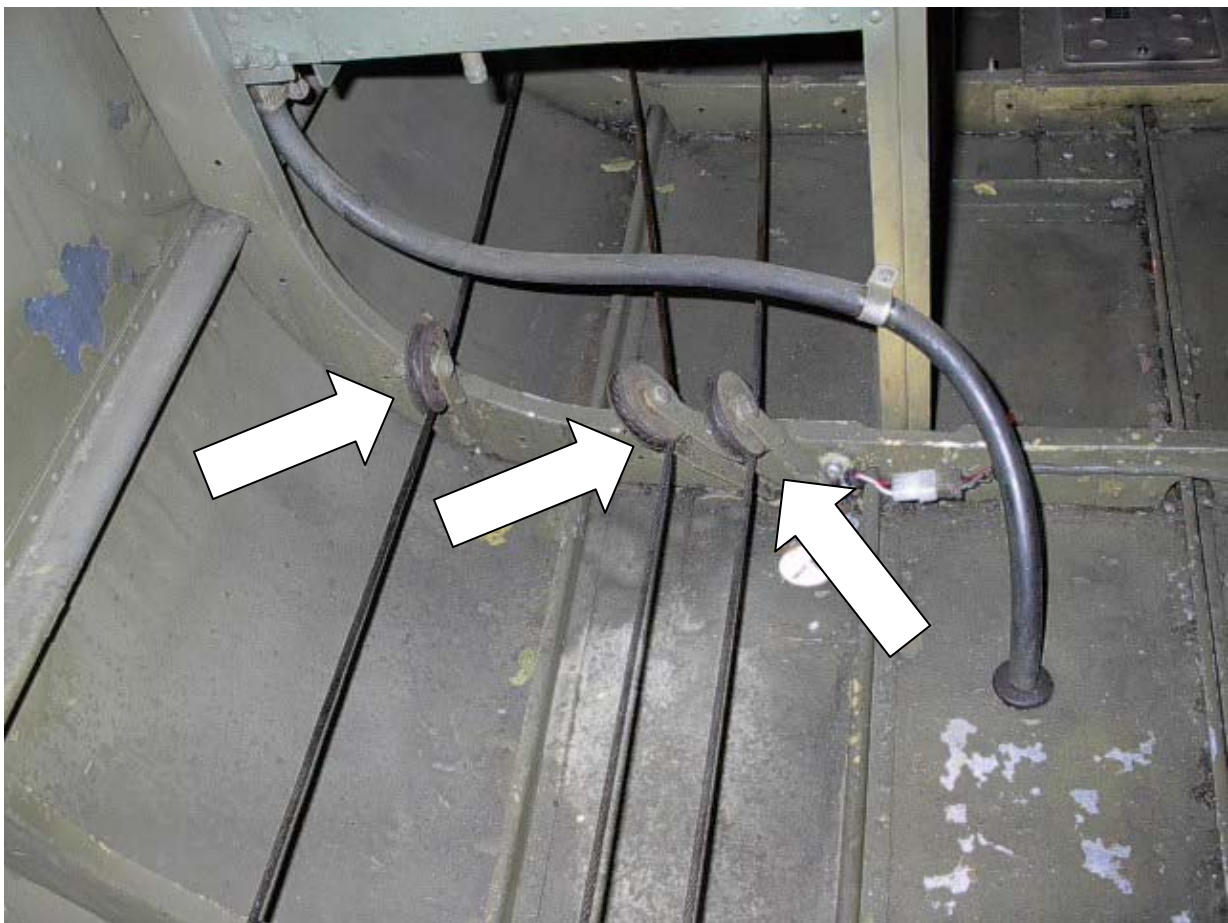
### ***Observations***

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NOTE: The outstanding items in this report were noted by personnel contracted to inspect the aircraft using civilian standards. For the purposes of this report, “unapproved” means not in accordance with DeHavilland DHC-2 manuals.

- 1. DHC-2 Maintenance Manual, Appendix 2, Part 5 TR 2-22 requires replacement of fuselage strut member every 15 years, no record of replacement. (See Canada AD CF-98-37 for Canadian accepted alternate means of compliance.)**
2. Landing gear rebound rubbers are due for replacement in accordance with (IAW) DHC-2 Maintenance Manual, Appendix 2, Part 5, TR 2-22.
3. Certification of the altimeter and transponder is not being complied with every 2 years. (FARs 43, 91)
4. Pitot-static check not documented in records provided for review.
5. Engine instruments need to have range markings redone IAW with the DHC-2 Flight Manual to show better accuracy. (If marked on the glass, a slip mark is needed across the glass and bezel.)
6. Required placard warning for no spins is not installed (reference Aircraft Specification A806, Note 2 (a) and (c).
7. Unapproved air speed indicator installed. Must be range marked per DHC-2 Flight Manual.
8. Fuel filler panel not sealed at bottom of panel as required by AD 53-23-02.
9. Hydraulic flap lines worn / chafing inside fuselage next to hydraulic ratchet valve.
10. Self-locking nuts not installed on left and right aft cabin roof windows.

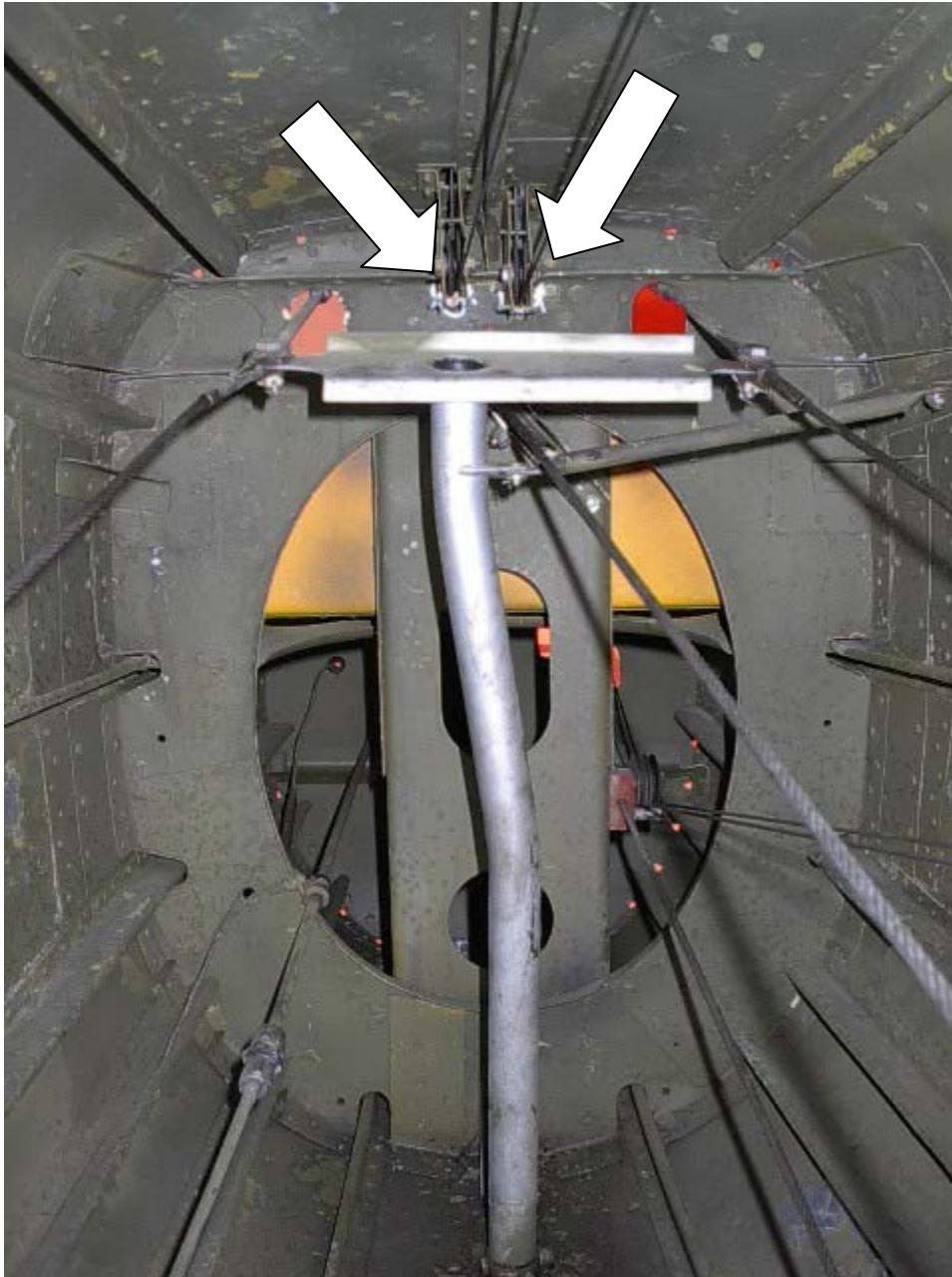
11. Two (2) cracks in center fuselage cabin roof skin support bracket just aft of the flap torque tube.
12. Flap hydraulic pump should be lockwired at left spool valve input lever.
13. Flap pump handle crank linkage worn at aft clevis pin attachments.
- 14. Both aft rudder cables worn and frayed at pulley brackets, STN 104.**
- 15. Aft upper elevator cable worn and frayed at pulley brackets, STN 104.**



- 16. Recommend the aileron control cables in the fuselage should be removed and inspected for wear and fraying.**

17. Rudder and elevator cable pulleys exhibit deep cable wear marks, STN 104.

**18. Aft fuselage channel, P/N C2FS405A at the top of STN 228 is cracked at rudder horn attach bolts.**





**19. Rudder control attachment bolt worn from lack of lubrication.**

20. Rudder and aileron cable turnbarrels, aileron turnbarrels at the control column attach chains and turnbarrels in both wings do not conform to Service Bulletin 2/40.

**21. STN 228 bulkhead, P/N C2FS533, failed AD99-15-07 inspection:**

- **Three areas have previously stopdrilled cracks and repair patches.**
- **Flush patch inserted into the bulkhead.**
- **Three areas showing signs of new crack propagation.**

22. Elevator trim travels do not meet requirements DHC-2 Maintenance Manual, Part 2, Table VI.

23. Rudder trim cables not rigged correctly, screw jack does not reach full travel when extended.

24. Horizontal stabilizer left front attachment bracket bushing is seized in the bracket.

25. Tail wheel shock strut leaking fluid.

26. No approvals or supporting data found in the reviewed aircraft records for the following installed modifications:

- i. Long-range belly fuel tank and Flight Manual Supplement
- ii. Concorde battery installed, smaller in amp hours (18 versus 24 or 36 original equipment)
- iii. Glider towing package and Flight Manual Supplement
- iv. Chip detector

27. Flight Manual and Supplements are required to be on the aircraft.

28. Weight and Balance and Equipment List are required to be on the aircraft.

29. Left elevator has two (2) unapproved repairs on the outboard upper skin, reference DHC-2 Repair Manual Section 3, paragraph 3.17.

30. Left elevator has two (2) unapproved repairs on the inboard upper skin, reference DHC-2 Repair Manual Section 3, paragraph 3.17.

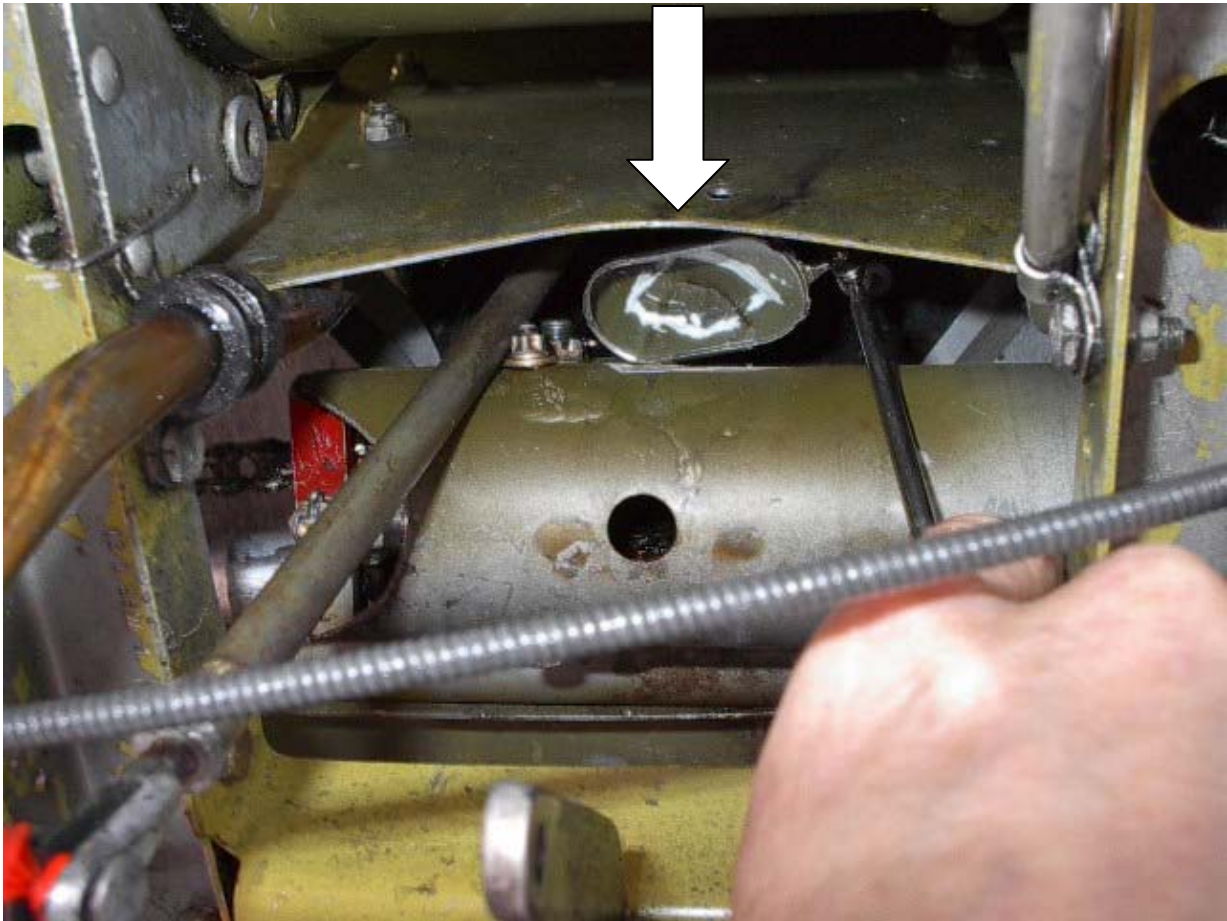
31. Left elevator has unapproved repair on lower skin, reference DHC-2 Repair Manual Section 3, paragraph 3.17.
32. Left elevator trim tab has an unapproved repair, reference DHC-2 Repair Manual, Section 2, paragraph 2.25.
33. Right elevator has two (2) unapproved repairs on upper skin, reference DHC-2 Repair Manual Section 3, paragraph 3.17.
34. Right elevator spar is cracked at outboard end next to attachment rib.
35. Right elevator trailing edge channel is cracked at trim tab outboard upper attachment area.
36. Rudder trim tab lower attachment bracket is loose at attach rivets.
37. Battery electrolyte is low and 2 cells have battery plates above electrolyte level.
38. Fuselage side skin support cracked on the inside just forward of the co-pilot door.
39. Oil tank in cockpit has evidence of leakage from the top of the tank at the vent pipe connections.
40. Center fuel tank has two (2) leaks on the top of the tank.
41. Rear fuel tank has a leak starting at the top access cover.
42. Oil cooler support bracket has inadequate clearance at control column elevator push-pull rod actuating arm.
- 43. Left and right rudder control cables are frayed ten (10) inches aft of the front attach point.**
44. Unapproved repairs to the right side skin at the upper landing gear fairing rivnuts.
45. Skins below cockpit doors have had a doubler installed over them to reinforce cracked rivnut locations, cracks continue to propagate.



46. Numerous areas of primer peeling from the inside of the fuselage skins, leaving bare metal.



**47. Control column cracked at bottom end.**



- 48. Flap torque tube and support bearings P/N C2CF1227A are worn.
- 49. Flap actuator forward attach point to connecting bolt is worn.
- 50. Right flap lower skin has three unapproved sheet metal repairs at the trailing edge.
- 51. AD 53-11-02, to prevent chafing of the accessory firewall on the engine oil sump, has not been complied with. Recommend that the AD be complied with at next engine removal.
- 52. According to records, left and right wing struts have not been inspected every 12 months as required by AD 88-08-02 since 1990**